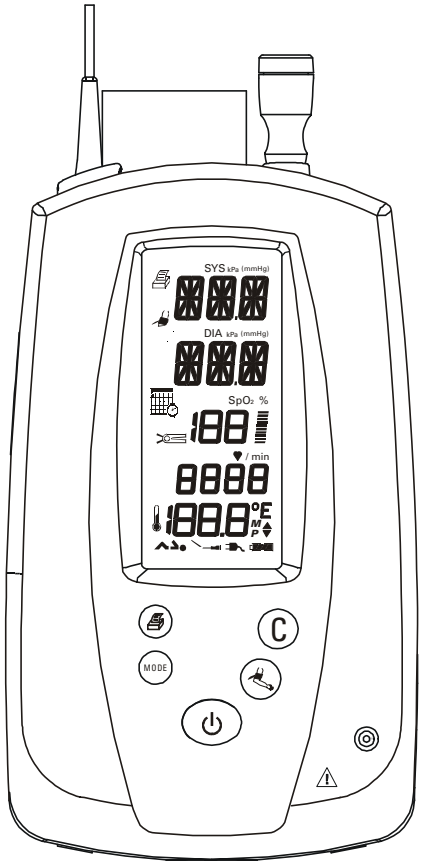
Manuals
Service Manual

Welch Allyn®

Spot Vital Signs
420 Series



Operator's Manual

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CAUTION: United States Federal law restricts this device to sale by or on the order of a health care practitioner.

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About the Operator's Manual

The Operator's Manual is designed to help you understand the capabilities and operation of your Welch Allyn Spot Vital Signs. The information in this manual includes all options available with the Spot Vital Signs (e.g., SpO_2, temperature, external printer, mobile stand and wall mount). The applicability of some sections of this Operator's Manual depends on the configuration of your particular unit.

This manual is a comprehensive guide to the operation of the Spot Vital Signs. To achieve satisfactory results, you should read this manual thoroughly before attempting to use the device. A Quick Reference card is provided with the device as a convenient reference for experienced operators.

Product Overview

The Welch Allyn Spot Vital Signs non-invasively and automatically measures systolic and diastolic pressure, pulse rate, and oxygen saturation (SpO_2) for adult and pediatric patients. Further, the Welch Allyn Spot Vital Signs measures temperature invasively in natural body orifices (i.e. mouth and rectum).

THE WELCH ALLYN SPOT VITAL SIGNS IS NOT INTENDED FOR USE ON NEONATAL PATIENTS.

All blood pressure, pulse, temperature and SpO_2 values are viewed on a large, easy-to-read display, and can be printed via the IrDA port to an external printer as desired.

The rechargeable lead acid battery and variety of mounting accessories make the Welch Allyn Spot Vital Signs convenient for many locations. You may choose any combination of simultaneous measurement modalities.

The Welch Allyn Spot Vital Signs can be used in a wide variety of health care settings. This includes hospital departments as well as alternate care settings such as physicians offices, clinics, and long term care facilities. The Welch Allyn Spot Vital Signs is not intended for continuous monitoring of patients, nor for use during the transport of a patient. The Welch Allyn Spot Vital Signs is not intended for use in environments that are not supervised by a health care practitioner.

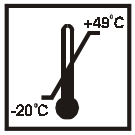
Symbols and Descriptions

Familiarize all operating personnel with the general safety information in this summary. Operator's will also find specific warnings and cautions throughout the operator's manual. Such specific warnings and cautions may not appear here in this summary.

Caution: Consult user's manual for additional information.

Type BF Equipment

Handle with Care



Transport Temperature.

Storage Humidity. Refer to

Internally Powered, Lead Acid Battery. For disposal see page 47.

Class II Equipment

IPXØ Not protected against the ingress of water.

Mode of Operation: Continuous

Safety Warnings and Precautions

All operating personnel should be familiarized with the general safety information in this summary. Specific warnings and cautions are also found throughout this Operator's Manual. Such specific warnings and cautions may not appear here in this summary.

General Warnings

THE WELCH ALLYN SPOT VITAL SIGNS IS NOT INTENDED TO BE USED ON NEONATAL PATIENTS. Welch Allyn defines neonates as children 28 days or less of age if born at term (37 weeks gestation or more); otherwise up to 44 gestational weeks. This definition comes from the AAMI SP10 1992 standard.

To ensure pediatric blood pressure accuracy and safety, note that the Welch Allyn Small Adult Cuff (5200-03), the Welch Allyn Small Child One-Piece Cuff (5200-13), or the Welch Allyn Small Child Cuff Disposable One-Piece (5083-93-3) are the SMALLEST CUFFS approved for use with young children and infants. The circumference of the child's arm must fit within the range markings on the cuff.

The Welch Allyn Spot Vital Signs is designed for use by medical clinicians. Although this manual may illustrate medical spot check techniques, only a trained clinician who knows how to take and interpret a patient's vital signs should use this system.

The information in this Operator's Manual is a comprehensive guide to the operation of the Welch Allyn Spot Vital Signs. To achieve satisfactory results, you should read the manual thoroughly before attempting to use the device.

The Spot Vital Signs is not intended for continuous monitoring and is therefore not defibrillator proof. **Do not leave the device unattended while taking measurements on a patient.**

To insure patient safety, use only accessories and supplies (i.e., cuffs, hoses, temperature probes, SpO_2 sensors, etc.) recommended or supplied by Welch Allyn for the Welch Allyn Spot Vital Signs. See "Supplies And Accessories" on page 48.

Do not operate the Welch Allyn Spot Vital Signs in the presence of flammable anesthetics or other explosive atmosphere. An explosion may result.

Avoid compression of the pneumatic tubing of the Welch Allyn Spot Vital Signs. Compression of the tubing may cause system errors to occur in the device.

Care should be taken to prevent water or other fluid from entering any connectors on the device. Should this occur, the connectors should be dried with warm air. All operating functions should then be checked for proper operation.

Any Spot Vital Signs which has been dropped or damaged should be checked by qualified service personnel to insure proper operation prior to use.

Every three months, inspect the temperature probe, SpO_2 Cord, and accessories for fraying or other damage. Replace as necessary.

There are no user-serviceable parts inside the device other than battery replacement. Refer to unit to the Authorized Service Center listed on page 52.

The Spot Vital Signs should not be used on patients who are linked to heart/lung machines.

The Spot Vital Signs does not operate effectively on patients who are experiencing convulsions or tremors.

This device complies with current required standards for electromagnetic interference, and should not present problems to other equipment or be affected by other devices. As a precaution, avoid using this device in close proximity to other equipment.

This device is not intended for hand-held use during operation.

Welch Allyn recommends that the battery is left in the device, regardless if the device is not used for long periods of time since there is no hazard of leaving the battery in the device.

Connection of accessories not approved by Welch Allyn with the Spot Vital Signs can affect patient and/or operator safety.

Do not autoclave.

Welch Allyn is NOT responsible for the integrity of any Wall or IV pole mounting interface. Welch Allyn recommends that the customer contact their Biomedical Engineering department or maintenance service to ensure professional installation, safety, and reliability of any mounting accessory.

Blood Pressure Warnings

- To ensure pediatric blood pressure accuracy and safety, note that the Welch Allyn Small Cuff (5200-03), the Welch Allyn Small Child One-Piece Cuff (5200-13), or the Welch Allyn Small Child Disposable One-Piece (5083-93-3) are the SMALLEST CUFFS approved for use with young children and infants. The circumference of the child's arm must fit within the range markings on the cuff.
- You may experience inaccurate blood pressure measurements if cuffs and/or hoses other than those provided for the Welch Allyn Spot Vital Signs by Welch Allyn are used.
- Patients that are experiencing moderate to severe arrhythmias may give inaccurate blood pressure measurements.
- When several blood pressure measurements are taken on the same patient, it is recommended that the cuff site and extremity are regularly checked for possible ischemia, purpura, and/or neuropathy.

SpO_2 Warnings

- The operation of the SpO_2 sensor in MRI environments is specifically not recommended.

- Use only SpO_2 sensors and accessories that are compatible with the SpO_2 configuration purchased. The Welch Allyn Spot Vital Signs with Nellcor Puritan Bennett™ pulse oximetry option may only be used with Nellcor Puritan Bennett™ brand sensors and accessories.
- The SpO_2 sensor and extension cables are intended for use only for pulse oximetry measurements. Do not attempt to connect these cables to a PC or any similar device.

⚠ Temperature Warnings

- Single-use, disposable probe covers, available from Welch Allyn, limit patient cross-contamination. The use of any other probe cover or the failure to use a probe cover may produce temperature errors and is specifically not recommended.
- Use only oral probes (blue) for taking oral and axillary temperatures. Only use rectal probes (red) for taking rectal temperatures only. The use of the wrong probe may produce temperature errors.
- Do not allow the tip of the temperature probe to come into contact with any heat source (e.g., hands or fingers) prior to taking a temperature measurement. If this occurs, discard the probe cover and start the temperature determination again.

⚠ IrDA Communications Port Warnings

- The Welch Allyn Spot Vital Signs contains an infrared communications port for isolated communications with the external printer (see order catalog) or with a PC. The port is located on the side of the device to preclude direct eye contact on a continual basis when viewing the display. As a precaution, do not look directly into the infrared port during operation.

⚠ General Cautions

- If the accuracy of any measurement is in question, check the patient's vital sign(s) by an alternate method, then check to make sure the device is functioning properly.
- Insure the device is placed on a secure surface or use one of the optional mounting accessories.
- Do not place fluids on the device.

⚠ Blood Pressure Cautions

- Extremity and cuff motion should be minimized during blood pressure determinations.
- If the blood pressure cuff is not at heart level, the difference in reading due to the hydrostatic effect should be noted. The value of 1.80 mmHg must be added to the displayed reading for every inch (2.5 cm) above heart level. The value of 1.80 mmHg must be subtracted from the displayed reading for every inch (2.5 cm) below heart level.
- Proper blood pressure cuff size and placement is essential to the accuracy of the blood pressure determination. See “Chart for Determining Cuff Size” on page 29 for cuff sizing information.
- When measuring blood pressure on children younger than 3 years of age it is recommended that the Pressure Preset (initial inflation pressure) be set at 160 mmHg or lower.

SpO_2 Cautions

- The pulse oximeter is calibrated to determine the percentage of arterial oxygen saturation of functional hemoglobin. Significant levels of dysfunctional hemoglobin such as carboyhemoglobin or methmoglobin may affect the accuracy of the measurement.
- Some intravascular dyes, depending on the concentration, may affect the accuracy of the SpO_2 measurement.
- Some sensors may not be appropriate for a particular patient. If at least 10 seconds of perfusion pulses cannot be observed for a given sensor, change sensor location or sensor type for perfusion to resume.

Temperature Cautions

- Normal mode (10 second) axillary temperatures are FDA approved only for children under the age of four. Normal mode axillary temperatures may not be accurate on older children or adults. *THE WELCH ALLYN SPOT VITAL SIGNS IS NOT INTENDED TO BE USED ON NEONATAL PATIENTS.*

Consignes de sécurité et précautions

Tout le personnel utilisant ce matériel doit se familiariser avec les consignes de sécurité générales présentées dans ce sommaire. Des avertissements et mises en garde spécifiques se trouvent également tout au long du manuel d'utilisation. Ces derniers peuvent ne pas être inclus dans ce sommaire.

Avertissements d'ordre général

⚠ LE SIGNES ESSENTIELS DE TACHE WELCH ALLYN NE DOIT PAS ETRE UTILISÉ SUR DES PATIENTS NÉONATALS.

⚠ Welch Allyn définit les nouveau-nés comme des enfants âgés de 28 jours ou moins, nés à terme (37 semaines de gestation ou plus) ; ou après un maximum de 44 semaines de gestation. Cette définition est tirée de la norme SP10 1992 de l'AAMI.

⚠ Pour assurer l'exactitude et la sécurité de la pression artérielle pédiatrique, on doit prendre note que le brassard pour adulte de petite taille (5200-03), le brassard monobloc pour enfant de petite taille (5200-13) ou le brassard monobloc jetable pour enfant de petite taille (5083-93-3) Welch Allyn sont LES PLUS PETITS BRASSARDS dont l'usage a été approuvé pour jeunes enfants et nouveau-nés. La circonférence du bras de l'enfant doit s'adapter entre les repères de plage du brassard.

⚠ Le Signes essentiels de tache Welch Allyn est conçu pour être utilisé par des cliniciens. Bien que ce manuel illustre des techniques de monitorage médical ponctuel, ce système ne doit être utilisé que par des cliniciens ayant reçu la formation nécessaire pour prendre et interpréter les signes vitaux d'un patient.

⚠ Les renseignements contenus dans ce manuel constituent un guide complet sur l'utilisation du Signes essentiels de tache Welch Allyn. Pour obtenir des résultats satisfaisants, il incombe à l'utilisateur de lire entièrement ce manuel avant d'utiliser le dispositif.

⚠ Le signes essentiels de tache n'est pas prévu pour une surveillance en continu et n'est donc pas résistant aux défibrillateurs. **Ne pas laisser ce dispositif sans surveillance lors de la prise de mesures sur un patient.**

Pour assurer la sécurité du patient, n'utiliser que des accessoires et du matériel (c'est-à-dire brassards, tuyaux, sondes de température, capteurs de SpO_2, etc.) recommandés ou fournis par Welch Allyn avec le Signes essentiels de tache Welch Allyn. Voyez "Supplies And Accessories" on page 48.

Ne pas utiliser le Signes essentiels de tache Welch Allyn en présence d'anesthésiques inflammables ou dans une atmosphère explosive sous risque d'explosion.

Éviter la compression de la tubulure pneumatique du Signes essentiels de tache Welch Allyn sous risque d'entraîner des erreurs du système.

Veiller à éviter la pénétration de l'eau ou d'autres liquides dans les connecteurs du dispositif. Si un tel incident survient, les sécher à l'air tiède. Vérifier ensuite toutes les fonctions pour s'assurer du bon état du dispositif.

Si un signes essentiels de tache est tombé ou a été endommagé, il doit être examiné par un personnel de réparation habilité pour assurer son bon fonctionnement avant usage.

Vérifier régulièrement les cordons pour s'assurer de l'absence d'effilochage ou d'autres détériorations ; les remplacer selon les besoins.

Ce dispositif ne contient aucune pièce réparable par l'utilisateur autre qu'une batterie de rechange. Référez-vous l'unité au Centres de réparations Welch Allyn á la page 52.

Ne pas utiliser ce dispositif sur des patients raccordés à un coeur-poumon artificiel.

Ce signes essentiels de tache ne fonctionne pas avec efficacité sur des patients atteints de convulsions ou de tremblements.

Ce dispositif est conforme aux normes actuelles requises se rapportant aux interférences électromagnétiques et ne devrait pas entraver le fonctionnement d'autres appareils, et réciproquement. À titre de précaution, éviter d'utiliser ce dispositif à proximité d'autres appareils.

Ce dispositif n'est pas destiné pour l'usage tenu dans la main lors du fonctionnement.

Tous les trois mois, examinent la corde sonde de la température, SpO2, et des accessoires pour déceler dommages frangeants ou autres. Substituez selon les besoins.

Welch Allyn recommande que la batterie est laissée dans le dispositif, sans se soucier si le dispositif n'est pas utilisé pendant de longues périodes.

La connexion des accessoires non approuvés par Welch Allyn avec les signes essentiels Spot peut affecter la sûreté de patient et/ou d'opérateur.

Ne stérilisez pas à l'autoclave.

Avertissements relatifs à la pression artérielle

- Pour assurer l'exactitude et la sécurité de la pression artérielle pédiatrique, on doit prendre note que le brassard pour adulte de petite taille (5200-03), le brassard monobloc pour enfant de petite

taille (5200-13) ou le brassard monobloc jetable pour enfant de petite taille (5083-93-3) Welch Allyn sont LES PLUS PETITS BRASSARDS dont l'usage a été approuvé pour jeunes enfants et nouveau-nés. La circonférence du bras de l'enfant doit s'adapter entre les repères de plage du brassard.

- Les mesures de pression artérielle peuvent être fausses si l'on utilise des brassards et/ou des tuyaux autres que ceux qui sont fournis avec le Signes essentiels de tache Welch Allyn.
- Les mesures de pression artérielle peuvent ne pas être exactes si elles sont prises sur des patients atteints d'arythmies modérées à intenses.
- Lorsque plusieurs mesures de pression artérielle sont prises sur le même patient, il est recommandé de vérifier régulièrement le site du brassard et l'extrémité portant le brassard pour détecter tous risques d'ischémie, de purpura et/ou de neuropathie.

⚠ Avertissements relatifs à la SpO_2

- Il est particulièrement recommandé de ne pas utiliser un capteur de SpO_2 dans un milieu IRM.
- N'utiliser que des capteurs de SpO_2 et des accessoires qui sont compatibles avec la configuration SpO_2 acquise. Le Signes essentiels de tache Welch Allyn à option d'oxymétrie de pouls Nellcor Puritan Bennett™ ne doit être utilisé qu'avec les capteurs et les accessoires de marque Nellcor Puritan Bennett™.
- Le capteur de SpO_2 et les câbles de rallonge ne doivent être utilisés qu'aux fins de mesures de l'oxymétrie de pouls. Ne pas essayer de raccorder ces câbles à un ordinateur ou autre dispositif similaire.

⚠ Avertissements relatifs à la température

- Les protections de sonde jetables, à usage unique, disponibles auprès de Welch Allyn limitent la contamination croisée des patients. L'utilisation d'une autre protection de sonde ou l'absence d'une telle utilisation risque de produire des erreurs de température et est particulièrement déconseillée.
- Les sondes buccales (bleues) sont uniquement destinées aux prises de température par voie buccale et axillaire. Les sondes rectales (rouges) sont uniquement destinées aux prises de température par voie rectale. L'emploi de la sonde incorrecte risque de produire des erreurs de température.
- Ne pas laisser l'extrémité de la sonde de température entrer en contact avec une source de chaleur (telle que les mains ou les pieds) avant d'avoir pris une mesure de température. Si un tel incident survient, jeter la protection de sonde et recommencer la détermination de température.

⚠ IAvertissements relatifs aux prises de communication IrDA

- Le Signes essentiels de tache Welch Allyn comprend un port de communication à infrarouge pour des communications isolées avec l'imprimante externe (voir le catalogue de commande) ou avec un ordinateur. Le port est situé sur le côté du dispositif afin d'éviter un contact oculaire continuel lors de la lecture de l'affichage. À titre de précaution, ne pas regarder directement dans le port à infrarouge lors de l'utilisation du dispositif.

Mises en garde d'ordre général

- Si l'on doute de l'exactitude d'une mesure, vérifier les signes vitaux du patient par une autre méthode, puis vérifier le fonctionnement du dispositif.
- S'assurer que le dispositif est placé sur une surface fixe ou utiliser l'un des accessoires de montage optionnels.
- Ne pas placer de liquides sur le dispositif.

Mises en garde relatives à la pression artérielle

- Minimiser le mouvement de l'extrémité et du brassard lors des déterminations de la pression artérielle.
- Si le brassard de tensiomètre n'est pas au niveau du cœur, il convient de noter la différence des résultats découlant de l'effet hydrostatique. Ajouter alors la valeur de 1,80 mmHg au résultat affiché pour chaque 2,5 cm (1 pouce) au-dessus du niveau du cœur. Soustraire la valeur de 1,80 mmHg du résultat affiché pour chaque 2,5 cm (1 pouce) au-dessous du niveau du cœur.
- La taille du brassard de tensiomètre et sa mise en place correctes sont essentielles à l'exactitude de la détermination de la pression artérielle. Voir la section "Tableau permettant de déterminer la taille du brassard" on page 27 pour toutes informations relatives à la taille du brassard.
- Lors d'une mesure de la pression artérielle sur des enfants de moins de trois ans, il est recommandé de positionner le préréglage de pression (pression de gonflage initiale) sur 160 mmHg maximum.

Mises en garde relatives à la SpO_2

- L'oxymètre de pouls est étalonné pour déterminer le pourcentage de saturation artérielle en oxygène de l'hémoglobine fonctionnelle. Des niveaux significatifs d'hémoglobine dysfonctionnelle telle que la carboxyhémoglobine ou la méthémoglobine peuvent influencer l'exactitude de la mesure.
- Certains colorants intravasculaires, en fonction de leur concentration, peuvent influencer l'exactitude de la mesure de SpO_2.
- Certains capteurs peuvent ne pas convenir à un patient particulier. Si l'on ne peut observer au moins 10 secondes de pulsations de la circulation sanguine pour un capteur donné, changer l'emplacement ou le type de capteur afin que la circulation sanguine reprenne.

Mises en garde relatives à la température

- Les températures axillaires en mode Normal (10 secondes) ne sont exactes que pour les enfants de moins de quatre ans. Elles peuvent ne pas être exactes pour des enfants plus âgés ou des adultes. LE SIGNES ESSENTIELS DE TACHE WELCH ALLYN NE DOIT PAS ETRE UTILISÉ SUR DES PATIENTS NÉONATALS.

Indications/Contraindications for Use

The Welch Allyn Spot Vital Signs measures blood pressure, pulse rate, temperature and oxygen saturation (SpO_2) of adult and pediatric patients. The device is not designed, sold, nor intended for use except as intended.

THE WELCH ALLYN SPOT VITAL SIGNS IS NOT INTENDED FOR USE ON NEONATAL PATIENTS.

To ensure pediatric blood pressure accuracy and safety, the Welch Allyn small cuff (5200-03), and the small durable cuff (5200-13) are the smallest cuffs approved for use with young children and infants. The circumference of the child's arm must fit within the range markings on the cuff.

The Welch Allyn Spot Vital Signs is not FDA approved to measure the axillary temperature of children 4 years of age or older.

The Welch Allyn Spot Vital Signs is not defibrillator proof.

The Welch Allyn Spot Vital Signs is not recommended for use on patients who are linked to heart/lung machines.

The Welch Allyn Spot Vital Signs is not recommended to continuously monitor a patient's vital signs.

Special Features

The following special features enhance the use of the Welch Allyn Spot Vital Signs:

Choice of Measurement Modalities

The Welch Allyn Spot Vital Signs takes non-invasive blood pressure, temperature, and SpO2 measurements independently or simultaneously.

Non-Invasive Oscillometric Blood Pressure

Eliminates the risk associated with invasive monitoring, with no need for microphones or external transducers.

Operator Friendly Results

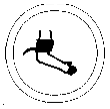
Large, easy-to-read Liquid Crystal Display (LCD).

AC or Self-Contained Battery Power

The Welch Allyn Spot Vital Signs can be made available in many convenient locations, for a variety of spot check needs.

Blood Pressure Measurements

A single blood pressure determination is made when the Blood Pressure Start/Stop button is pushed.



To cancel a measurement cycle at any time, press the Blood Pressure Start/Stop button again. This action immediately initiates a rapid cuff deflation.

The blood pressure measurement data appears on the display immediately following the measurement, and remains displayed for 2 minutes. After 2 minutes, the display goes blank, and the device goes into standby mode. To recall the most recent blood pressure measurement, press the Print, Mode, Next Patient/Clear or Blood Pressure Start/Stop button.

Maximum and Minimum Blood Pressure Ranges

The maximum and minimum blood pressure ranges are as follows:

Measurement	Maximum	Minimum
Systolic Pressure	250 mmHg	60 mmHg
Diastolic Pressure	160mmHg	30 mmHg

Mean Arterial Pressure (MAP)

The MAP ranges are 40 to 190mmHg, calculated from systolic and diastolic data (not directly measured).

Temperature Operating Modes

Thermometry measurements are made with Welch Allyn SureTemp™ technology. Oral and rectal probes utilize single-use disposable probe covers that limit cross-contamination. Oral, axillary or rectal temperatures are taken using Normal or Monitor operating modes. Oral and axillary temperatures are taken using the blue oral probe. Rectal temperatures are taken using the red rectal probe.

In Normal mode, the thermometer's microprocessor predicts body temperature in approximately 4 seconds for oral temperatures, 10 seconds for axillary temperatures, and 15 seconds for rectal temperatures. When using Monitor mode, allow the temperature read out to stabilize for 3 minutes for oral and rectal temperatures, and 5 minutes for axillary temperatures. The Monitor mode continues to display an updated temperature as long as the probe remains in place. Settings for Fahrenheit or Celsius scales are available for the temperature readings display.

Maximum and Minimum Temperature Ranges

The maximum and minimum temperature ranges are as follows

Measurement	Maximum	Minimum
Temperature	109.4°F 43.0°C	86.0°F 30.0°C

Normal Temperature Mode

Normal oral mode is the default operating mode for temperature determinations.

In Normal mode, the Spot Vital Signs measures temperature at discrete intervals, then calculates the rate of change according to a proven algorithm. This allows the thermometer to predict the end point the thermistor would reach if it were left in the mouth until it reached mouth temperature. This predictive feature allows the thermometer to arrive at an accurate oral temperature reading in approximately 4 seconds.

Operator-selectable patient alarm limits are not available in Normal temperature mode. However, temperatures that are outside the operating range of the device are noted on the temperature display (see "Temperature Measurement Range Indicators" on page 27 for further details).

Monitor Temperature Mode

Continuous Monitor mode operation is normally used when difficult situations prevent taking accurate temperatures in the Normal mode, or in clinical situations in which the clinician is interested in trending the patient's temperature (see "Temperature Measurement Range Indicators" on page 27 for further details). Maintain probe contact with the tissue for at least 3 minutes for accurate oral/rectal temperature measurement, and 5 minutes for accurate axillary temperature measurement. Monitor mode temperatures may not match identically to predicted "normal" temperatures because of ambient temperature influence and other factors. The trend in temperature is the important standard when in Monitor mode.

Operator-selectable patient alarm limits are not available in Monitor temperature mode. However, temperatures that are outside the operating range of the device are noted on the temperature display (see "Temperature Measurement Range Indicators" on page 27 for further details).

SpO_2 Operating Mode

The Spot Vital Signs incorporates the Nellcor Puritan Bennett™ pulse oximetry system which determines arterial oxyhemoglobin saturation (SpO_2%) by measuring the absorption of red and infrared light passed through the tissues. Changes in absorption caused by pulsation of blood in the vascular bed are used to determine arterial saturation and pulse rate.

Oxygen saturation percent is calculated with each pulse detected, so the display is continually updated. The pulse signal bar graph is an indicator of the strength and quality of the detected pulses.

The Spot Vital Signs determines pulse rate as an adjunct to blood pressure measurement and SpO_2 measurement.

The pulse rate, in beats per minute, is determined primarily from the SpO_2 measurement methodology. In the case where SpO_2 is not available, or is disabled, the pulse rate display is driven from data collected as part of the blood pressure measurement method.

Removal of the SpO_2 sensor from the patient initiates an audible beep, to alert you to the fact that the sensor is no longer attached to the patient.

SpO_2 is generally measured via pulses detected using a finger sensor, and performs most accurately with the finger clip sensor. All fingers, except the thumb, can use the finger clip sensor. For certain situations, measurement and alternate site measurements for SpO_2 can include the earlobe, forehead, and toes. These situations require special sensors (see "Appendix A - SpO2 Sensors" on page 55). The finger clip sensor is recommended for spot checks or short-term evaluation (less than 60 minutes). Patient supervision is required, since the Spot Vital Signs has no alarm capability.

Oxygen saturation and pulse rate are displayed on the LCD screen. On each detected pulse, the pulse signal bar graph flashes. The intensity of this signal is a simple visual indicator of waveform signal strength, and can identify possible situations of inadequate pulsatile nature of tissue for an accurate SpO_2 reading. The update interval bar of the bar graph should correspond to the patient's pulse rate. This is an indication of the quality of the SpO_2 signal.

Maximum and Minimum SpO_2 Ranges

The maximum and minimum SpO_2 ranges are as follows:

Measurement	Maximum	Minimum
SpO_2	100%	40%

Pulse Rate

The Welch Allyn Spot Vital Signs determines pulse rate as an adjunct to blood pressure measurement and SpO_2 measurement.

The pulse rate, in beats per minute, is determined primarily from the SpO_2 measurement methodology. In the case where SpO_2 is not available or is disabled, the pulse rate display is derived by data from the blood pressure measurement method.

Maximum and Minimum Pulse Rate Ranges

The maximum and minimum pulse rate ranges are as follows:

Measurement	Maximum	Minimum
Using BP determination	200 bpm	40 bpm
Using SpO_2 determination	245 bpm	25 bpm

Performance Specifications

Patient Population

The Welch Allyn Spot Vital Signs is designed for use with adult and pediatric patients. Welch Allyn defines a pediatric patient as 29 days old or more.

THE WELCH ALLYN SPOT VITAL SIGNS IS NOT INTENDED FOR USE ON NEONATES.

Welch Allyn defines neonates as children 28 days or less of age, born at term (37 weeks gestation or more), otherwise up to 44 gestational weeks.

Cuff Pressure Range

0 mmHg - 300mmHg

Initial Cuff Inflation

160 mmHg

Systolic Determination

Maximum: 250 mmHg
Minimum: 60 mmHg

Diastolic Determination

Maximum: 160 mmHg
Minimum: 30 mmHg

Blood Pressure Accuracy

Blood pressure accuracy meets or exceeds SP10-1992 AAMI standards for non-invasive blood pressure accuracy (AAMI standard: ± 5 mmHg mean error, 8 mmHg standard deviation). Blood pressure accuracy is validated for pressure measurement using the upper arm only.

Blood Pressure Determination Time

Typical: 20 to 45 seconds
Maximum: 165 seconds

Pulse Rate Determination (using SpO_2 determination)

Maximum: 245bpm
Minimum: 25bpm

Pulse Rate Accuracy

SpO_2 Module Heart Rate: ±3.0 bpm
Blood Pressure Algorithm Heart Rate: ±5.0%

Overpressure Cutoff

315 mmHg ±15 mmHg

Temperature Ranges

Measurement	Maximum	Minimum
Temperature	109.4° F 43.0° C	86.0° F 30.0° C

Temperature Accuracy

Calibration accuracy: ± 0.2 F (± 0.1 C).

Temperature Determination Time

Oral: 4 seconds typical, 15 seconds maximum
Axillary: 10 seconds typical
Rectal: 15 seconds typical

Oxygen Saturation Range (SpO_2%)

40-100% oxygen saturation

SpO_2 Accuracy

±3% in the range of 70-100% oxygen saturation (1 standard deviation)
<70% unspecified by the OEM

Battery Charging

The battery charges to 90%-100% capacity in 12 hours. Unit operates and charges battery simultaneously when connected to power source.

Mechanical Specifications

Dimensions

Height: 9.70 inches (24.64 cm)
Length: 5.72 inches (14.53 cm)
Depth: 4.73 inches (12.01 cm)

Weight

Approximately 4.25 pounds (1.91 kg)

Mounting

Self-supporting on rubber feet

Custom Mobile Stand
Custom made Wall Mount
Custom made IV Pole Mount

Portability

May be hand-carried when held by the rear handle.

Electrical Specifications

Power Requirements

Patient-Rated isolation transformer is connected to AC mains:

North American Version:	120VAC, 60 Hz. 0.20A Input Source, 8VDC, 0.75A Output Source
International Version:	230VAC, 50Hz 0.20A Input Source, 8VDC, 0.75A Output Source 240VAC, 50Hz 0.20A Input Source, 8VDC, 0.75A Output Source

Battery

Lead acid, with external charger.

A fully charged battery supports 150 typical blood pressure determinations taken at 7 minute intervals. The battery is 90-100% charged after 12 hours of charging. The battery automatically charges when the Spot Vital Signs is powered through the AC power transformer. The battery charges faster when the instrument is not in operation.

Environmental Specifications

Operating Temperature

+10° to +40°C (Thermometer operating temperature 16° to 40° C)
+50° to +104°F

Storage Temperature

-20° to +50°C
-4° to +122°F

Transport Temperature

-20° to +49°C
-4° to +122°F

Relative Humidity

15 to 90% (non-condensing)

Operating Altitude

-170 to +4877 m
-557 to +16,000 ft.

Agency Approvals

CERTIFIED TO: CAN/CSA STD C22.2 NO. 601.1

CONFORMS TO: IEC 60601, UL STD 2601-1

EMC Framework of Australia

CE 0050 The CE mark on this product indicates that it has been tested to and conforms with the provisions noted within the 93/42/EEC Medical Device Directive.

Authorized European Representative Address:

European Regulatory Manager
Welch Allyn Ltd.,
Kells Road, Navan,
County Meath, Republic of Ireland.
Tel.: 353-46-79060
Fax: 353-46-27128

Unpacking Checklist

After you have unpacked the Welch Allyn Spot Vital Signs and applicable accessories, identify each item with the following checklist, and inspect for missing items. Retain the shipping materials in the event of shipping damage or for return, if necessary, to Welch Allyn for repair or warranty service.

All Spot Vital Signs include the following components:

Spot Vital Signs
This device is portable, lightweight and designed to automatically measure and display blood pressure and pulse rate. Options include thermometry, pulse oximetry, and an external printer that communicates via IrDA interface.

Operator's Manual
To achieve satisfactory results, you should read this manual thoroughly before attempting to use the Spot Vital Signs. Save this manual for helpful product reference.

Quick Reference/Error Code Card
The Quick Reference Card provides a quick operation guide and error codes. The card is attached to the device handle or mobile stand.

Instrument Warranty Card
Fill the warranty card out today and return to the Welch Allyn Service Center. This card validates your warranty.

Adult Durable Cuff Assembly
Includes one adult and pneumatic tubing with connector. Other size cuff assemblies are available separately.

Pressure Hose
Includes a latex-free pressure hose with connector. This hose connects a variety of sizes of blood pressure cuffs to the Spot Vital Signs.

Power Transformer and Cord Assembly
Operates the Spot Vital Signs and charges the internal battery.

Certain Spot Vital Signs include the following items, based on the options purchased:

Temperature Probe and Covers
The device includes one oral temperature probe (blue probe) and one box of 25 single use, disposable probe covers for temperature determinations.

Pulse Oximetry (SpO_2) Option
The finger clip SpO_2 sensor and cord are for use with both adult and pediatric patients. Other sensors are available separately (see "Appendix A - SpO2 Sensors" on page 55).

Optional External Printer
The Spot Vital Signs communicates to the external printer through the infrared port.

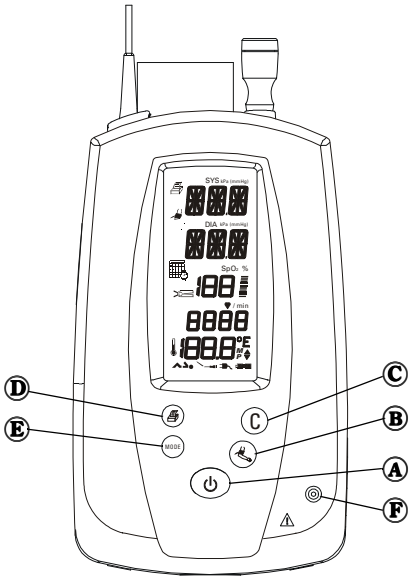
Roll of Printer Paper
One roll is pre-loaded into the printer.

Note: Report any signs of shipping damage to the carrier. If an item is missing or damaged, contact the Welch Allyn Service Center near you.

Controls, Indicators, and Connections

Note: In this section, all drawing and text are representative of the Spot Vital Signs with all available options. Your device may not include all functions, depending on the options purchased.

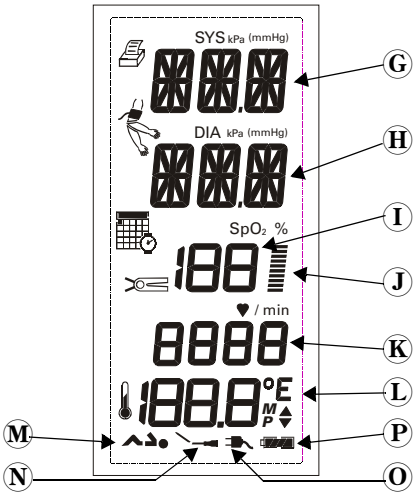
Front Panel Functions



	Description	Function
A	Power Button	This on/off button controls power to the device. Battery power is used unless the device is powered through the AC power transformer.
B	Start/Stop Blood Pressure Button	Pressing this button initiates a new blood pressure cycle. Pressing this button again cancels the cycle and immediately deflates the cuff.
C	Next Patient/ Clear Button	• Pressing this button while the display is active, clears the display. • Pressing this button while the device is in standby mode, recalls the last patient information. • Pressing this button a second time clears the screen.
D	Print Button	Pressing this button initiates a print operation.
E	Mode Button	• Pressing this button for 2 seconds while the display is active, turns off/on the backlight. • Pressing this button while the device is in standby mode, recalls the last patient information. • With the temperature probe removed from the probe holder, pressing the Mode button switches the temperature from Oral to Axillary mode.
F	Pressure Hose Connector	Connector for black, coiled pressure hose.

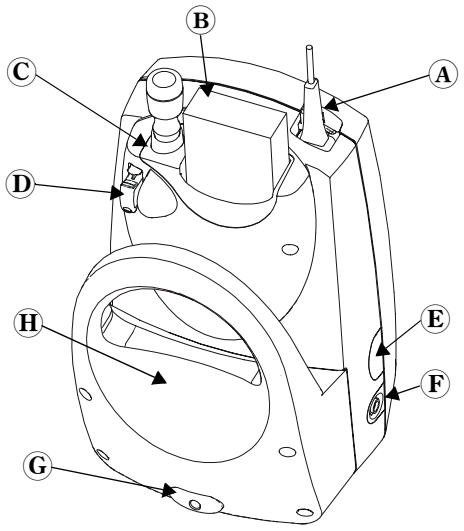
LCD (Liquid Crystal Display)

The liquid crystal display may indicate any of the following: systolic blood pressure (kPa or mmHg), diastolic blood pressure (kPa or mmHg), temperature (°F or °C), temperature method, pulse rate, pulse signal level, SpO_2, MAP, and battery charge level.



	Description	Function
G	Systolic Display	This LCD shows the systolic blood pressure. If MAP is turned on, the screen toggles between the systolic value and the word "MAP."
H	Diastolic Display	This LCD shows the diastolic blood pressure. If MAP is turned on, the screen toggles between the diastolic value and MAP value.
I	SpO_2 Display	Shows the percent saturation of arterial hemoglobin (SpO_2).
J	Pulse Signal Bar Graph	The bar graph gives a visual indication of the strength and quality of the pulses detected by the SpO_2 sensor.
K	Pulse Display	Shows the pulse rate.
L	Temperature Display and Indicator	Shows the temperature in degrees, Fahrenheit or Celsius.
M	Thermometer Probe Setting Indicator	Shows a stick figure to indicate probe setting (oral, axillary or rectal).
N	Temperature Probe Problem Indicator	Displays a broken probe icon to indicate a temperature probe problem.
O	Battery Charging Indicator	Displays a plug icon when the device is powered through the AC power transformer.
P	Battery Level Indicator	Continuously displays a battery icon with segments, to show the battery power level. The segments indicate the charge level of the battery. A fully charged battery has all segments illuminated. As the battery level drops, segments turn off. While the internal battery is charging, the icon segments continuously sequence.

Top, Side, and Rear Panel Connections



	Description	Function
A	SpO_2 Sensor Connection	9 pin connector for the SpO_2 sensor.
B	Probe Cover Storage Compartment	Convenient storage space for one box of probe covers.
C	Temperature Probe Holder	The active temperature probe is inserted here when not in use. Removing and replacing the probe turns the temperature on and off, respectively.
D	Temperature Probe Connector	Connector for oral probe.
E	IrDA Data Interface	Port for communicating with an external computer or printer.
F	Transformer Power Connector	AC power transformer connector.
G	Threaded Insert	Mounts the Spot Vital Signs to a mobile stand.
H	Battery Compartment	Contains the internal battery. Remove the 4 screws to change the battery without affecting other internal parts.

Setup Procedure

Charging the Battery

The Welch Allyn Spot Vital Signs Device may be powered by either AC power or battery power after the battery has been charged.

UPON INITIALLY RECEIVING THE DEVICE, CHARGE THE BATTERY FOR SIXTEEN (16) HOURS OR UNTIL THE CHARGING ICON NO LONGER FLASHES. The battery is charged by attaching the AC power transformer to the device and plugging the AC power transformer into the AC mains power source.

Blood Pressure Hose and Cuff Connections

Identify and have each of the following items available:

- The Welch Allyn Spot Vital Signs
- One-piece blood pressure cuff
- Black pressure hose

Perform the following set-up procedures:

1. Inspect the black pressure hose; note that one end has a connector fitting and the other end does not. Attach the end without the connector to the pressure hose connector on the Spot Vital Signs. Verify that the pressure hose is completely inserted over the connector and that the fit is snug.
2. Join the other end of the black pressure hose to the pneumatic tubing attached to the cuff. Twist the black connectors together until finger-tight. ***DO NOT OVER TIGHTEN***.

Temperature Probe Connection

The Welch Allyn Spot Vital Signs is available with two probes; one for oral/axillary temperatures (blue), and one for rectal temperatures (red). The rectal probe is an accessory item that is ordered separately.

To install the temperature probe, press down on the tab on top of the connector and insert the connector into the temperature probe connector port on the back of the Spot Vital Signs. Make sure the connector clicks into place. The probe connector is only inserted one way, with the tab on top. Insert the temperature probe into the probe holder on the top of the Spot Vital Signs.

To remove the temperature probe, press down on the connector tab and slide the connector out.

SpO_2 Sensor Connection

The Welch Allyn Spot Vital Signs is available with a wide variety of SpO_2 sensors. The reusable finger clip sensor is shipped with the Spot Vital Signs. Order all other sensors separately as accessory items (see "Appendix A - SpO2 Sensors" on page 55).

Attach the Nellcor Puritan Bennett SpO_2 sensor to the pulse oximetry extension cable. Insert the connector end of the extension cable into the SpO_2 connector port on the top of the Spot Vital Signs. The extension cable is only inserted one way; match the shape and pin configuration of the connector to the port. Push the connector in until it is fully seated on the port.

Note: Only Puritan Bennett™ SpO_2 sensors and accessories may be used with this configuration of the Welch Allyn Spot Vital Signs.

AC Power Connection

The Welch Allyn Spot Vital Signs may be powered by either AC power or battery power after the battery has been charged.

To install the AC power transformer, insert the round transformer connector into the power port on the side of the Spot Vital Signs. Insert the connector into the port until it is fully seated. Insert the line cord into the line connector on the transformer.

To power the Welch Allyn Spot Vital Signs, plug the line cord into the AC main power source.

Charging the Battery

The Welch Allyn Spot Vital Signs may be powered by either AC power or battery power after the battery has been charged.

UPON RECEIVING THE SPOT VITAL SIGNS, CHARGE THE BATTERY FOR SIXTEEN (16) HOURS PRIOR TO INITIAL USE.

The battery is charged by attaching the AC power transformer to the Spot Vital Signs, and plugging the AC power transformer into the AC main power source.

While the Spot Vital Signs is charging, the charger icon remains on and the battery icon segments continuously sequence.

Changing the Time/Date Set

1. Initiate the Spot Vital Signs internal configuration settings menu by powering on the unit while pressing and holding the Blood Pressure Start/Stop button. The first message displayed is the revision level of the internal software.
2. Press the Mode button to advance to the Date Set Screen. The day, month, and year appear in the systolic, diastolic, and heart rate displays, respectively.
3. Use the Mode button to select the date item to be changed. When selected, the date item flashes.
4. Use the Next Patient/Clear and Blood Pressure Start/Stop buttons (arrow up or arrow down) to change the selected date item.
5. After making all the desired date changes, press the Mode button ONCE to save the changes and advance to the Time Set Screen.
6. When in the Time Set Screen, the hour (in 24 hour format), and minutes appear in the systolic and diastolic displays respectively. Use the Mode button to select the time item to be changed. When selected, the time item flashes. Use the Next Patient/Clear and Blood Pressure Start/Stop buttons to set the time (in the same manner as described in step 4.).
7. When the time is set as desired, press the Mode button to save the time and advance to the next screen.
8. Press the green Power button to turn off the Spot Vital Signs.

Quick Reference/Error Code Card

The Quick Reference/Error Code Card should be attached either to the Spot Vital Signs handle, the Mobile Stand, or the Wall Mount.

Power On/Off and System Check Procedure

Each time the Welch Allyn Spot Vital Signs is turned on, the unit performs an internal self-diagnostic check.

To turn the unit on, press the green Power button.

Upon power up, all the LCD segments in each display turn on briefly and a beep sounds. If the internal self-check is successful, the displays assume their normal functions and the device is ready for operation. If the self-check fails, an error code is shown in the display.

To turn the unit off, press the green Power button.

Note that turning the unit off erases stored blood pressure, temperature, SpO_2, and pulse rate data.

Standby Mode

When the device is powered up, but has not been used for 2 minutes, it goes into standby mode. "Z Z Z" appears across the top of the display with no backlight. Standby mode conserves battery power.

To bring the Spot Vital Signs out of standby mode, press the Mode button.

Temperature Measurement Range Indicators

The high and low measurement ranges of the temperature module are as follows:

High Measurement Range:	109.4°F	43°C
Low Measurement Range:	86°F (Monitor Mode)	30°C
	94°F (Predictive Mode)	34.5°C

IMPORTANT: There is no audible tone to indicate that the temperature is outside the measurement range of the device. There is a visual indicator only.

The following display appears when temperatures are outside of the measurement range of the device:

Condition	Temperature	Display
Temperature is outside of high measurement range of the device	Fahrenheit Celsius	109.4° ⇑ 49° ⇑
Temperature is outside of low measurement range of the device	Fahrenheit Celsius	86° ⇓ 30° ⇓

Measuring Blood Pressure

Setting the Default Inflation Pressure Preset Level

The default cuff inflation level for blood pressure measurements is set in the Spot Vital Signs internal configuration menu. The factory default level is 160 mmHg. If desired, change the default pressure preset by following these instructions:

1. Turn the Spot Vital Signs off.
2. Press both the Power button and the Blood Pressure Start/Stop button simultaneously. The device enters its internal configuration mode.
3. Press the Mode button to cycle through the menu until you see "PRP" appear in the systolic display, and the pressure default level appears in the diastolic display.
4. Press the Next Patient/Clear or Blood Pressure Start/Cancel button to cycle through the 7 options available: 120, 140, 160, 180, 200, 240, and 280 mmHg.
5. When the desired Pressure Preset level is illuminated, press the Mode button once to save this change.
6. Turn the device off.

When the device is turned on, the new Pressure Preset is established as the default level. The device always reverts to this Pressure Preset level.

Caution: When measuring blood pressure on children younger than age 3, it is recommended that the Pressure Preset (initial inflation pressure) be set at 160 mmHg or lower.

Blood Pressure Cuff Selection Criteria

Note: An adult durable blood pressure cuff is included with your Spot Vital Signs. A full range of cuff sizes are available as accessory items, however, the Adult Durable cuff fits the majority of adults and give the most accurate blood pressure measurement.

Research has shown that an undersized cuff overestimates the true blood pressure by as much as 10 to 30 mmHg. Please refer to the reference markings on the cuff for correct cuff sizing. When there is an area of overlap whereby you could use a smaller or larger cuff, it is strongly recommended that you use the larger size cuff.

You may find that the bottom of the cuff extends to the antecubital fossa (bend in the elbow) on many people, but because the device uses oscillometric technology, not auscultation, this does NOT result in an inaccurate blood pressure.

Careful sizing of the cuff is important to the accuracy of blood pressure readings. If the cuff is too small, you may have falsely high readings. If the cuff is too large, you may have falsely low readings.

To accurately determine the correct cuff size, refer to "Chart for Determining Cuff Size" on page 29.

Determining Cuff Size with the Cuff Markings

One way to insure proper cuff size is to wrap the cuff around the patient's upper arm and visually check it. The cuff is marked with a distinct white edge and two divisions that indicate "range." When the cuff is properly fit, the edge meets the cuff at some point within the range.

Chart for Determining Cuff Size

You can also determine cuff size by measuring the patient's arm circumference midway between the elbow and shoulder, then use the chart below to select the correct cuff.

Durable One-Piece Cuff (Single Unit)	Disposable One-Piece Cuffs (5 pack)	Cuff Size	Minimum (cm)	Maximum (cm)	Minimum (inches)	Maximum (inches)
5200-13	5082-93-3	Small Child	12.4	16.8	4.9	6.6
5200-14	5082-94-3	Child	15.8	21.3	6.2	8.4
5200-15	5082-95-3	Small Adult	20.0	27.0	7.9	10.6
5200-16	5082-96-3	Adult	25.3	34.3	10.0	13.5
5200-17	5082-97-3	Large Adult	32.1	43.4	12.6	17.1
5200-18	5082-98-3	Extra Large Adult	40.7	55.0	16.0	21.7

THE WELCH ALLYN SPOT VITAL SIGNS IS NOT INTENDED TO FOR USE ON NEONATAL PATIENTS.

To ensure pediatric blood pressure accuracy and safety, note that the Welch Allyn Small Child Cuff (5200-03), the Welch Allyn Small Child One-Piece Cuff (5200-13), and the Welch Allyn Small Child Disposable One-Piece (5082-93-3) are the smallest cuffs approved for use with young children and infants. The circumference of the child's arm must fit within the range markings on the cuff.

Positioning the Cuff

The preferred blood pressure measurement site for adults and children is the upper arm. Keep the patient's arm relaxed and motion-free during measurement(s). Alternate blood pressure measurement sites include the ankle or forearm.

Warning: Do not place the cuff on any extremity that is used for intravenous infusions, or any area where circulation is compromised.

Note: Cuff inflation during an SpO_2 measurement may cause inaccurate SpO_2 results when used on the same arm.

Wrap the cuff snugly with room between the cuff and the arm for two fingers. Excessive tightness may cause venous congestion and discoloration of the limb. Possible error may occur if the cuff is wrapped too loosely, preventing proper inflation.

It is best to place the cuff on a bare arm. Clothing interferes with measurement accuracy.

When wrapping the cuff, observe the mark on the cuff that is placed over the artery. Insure that the hose is not twisted, kinked or compressed, as this may cause measurement errors.

Manual Blood Pressure Measurement

To initiate blood pressure measurements on demand:

1. Insure that the blood pressure cuff is properly sized and wrapped around the patient's upper arm (or alternate site, as necessary).
2. With the device powered on, press the Blood Pressure Start/Stop button.

   The Spot Vital Signs inflates the cuff to the appropriate level.
3. The systolic display shows the pressure in the cuff as the blood pressure determination is in process.
4. When the measurement cycle is complete, the systolic, diastolic and pulse rate* are displayed.
5. The blood pressure reading is displayed for 2 minutes, then disappears (unless another measurement is active). Pressing the Mode button on the Spot Vital Signs front display recalls the blood pressure reading.
6. Pressing the Blood Pressure Start/Stop button again at any time during a blood pressure determination aborts the measurement and rapidly deflates the cuff.

* Pulse rate, as determined from the blood pressure measurement method, is displayed with the BP reading only if the SpO_2 option is absent or disabled. If the SpO_2 function is operational, all pulse rate determinations are a result of the SpO_2 measurement method.

Reviewing Information from the Last Cycle

The Spot Vital Signs holds the last patient vital signs data (blood pressure, pulse rate and/or temperature and/or SpO_2) in memory. The information is held in memory until the unit is turned off, or you initiate the next patient's measurement. If the display is blank, press the Mode Button to review data from the last vital signs measurement. The most recently obtained data appears in the appropriate displays.

Measuring Temperature

Selecting the Temperature Scale

The Welch Allyn Spot Vital Signs can display temperature in either degrees Fahrenheit (°F) or degrees Celsius (°C). To determine the current temperature scale, remove the temperature probe from its holder and view the Temperature display, which shows either "°F" or "°C."

To change the temperature scale, you must enter the device's internal configuration mode:

1. Turn the Spot Vital Signs off.
2. Press both the Power and Blood Pressure Start/Stop buttons simultaneously. The device enters its internal configuration mode.
3. Press the Mode button to cycle through the menu until you reach the temperature option screen.
4. The first option illuminated on the temperature display is "°F." Pressing the Next Patient/Clear button once illuminates "°C."
5. When the desired temperature scale is selected, press the Mode button once to save this change.
6. Turn the device off.

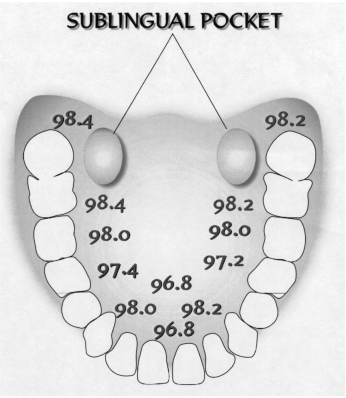
When the device is turned on, the new temperature scale is established as the default scale. The device always reverts to this temperature scale.

Selecting Temperature Operation Mode

When configured with the temperature option, the Welch Allyn Spot Vital Signs takes a temperature in either Normal or Monitor mode.

In the Normal mode, the thermometer's microprocessor "predicts" body temperature in approximately 4 seconds for oral temperatures, 10 seconds for axillary temperatures, and 15 seconds for rectal temperatures.

For accurate oral temperatures, place the oral probe in the posterior medial sublingual pocket.



Monitor mode is normally used when difficult situations prevent taking an accurate temperature in the Normal mode. In Monitor mode, maintain probe contact with the tissue for at least 3 minutes for accurate oral/rectal temperature measurement, and 5 minutes for accurate axillary temperature measurement.

The default setting for the Spot Vital Signs thermometer is Normal mode.

Note: Normal mode axillary temperatures are FDA approved for children under the age of four.

THE WELCH ALLYN SPOT VITAL SIGNS IS NOT INTENDED FOR USE ON NEONATAL PATIENTS.

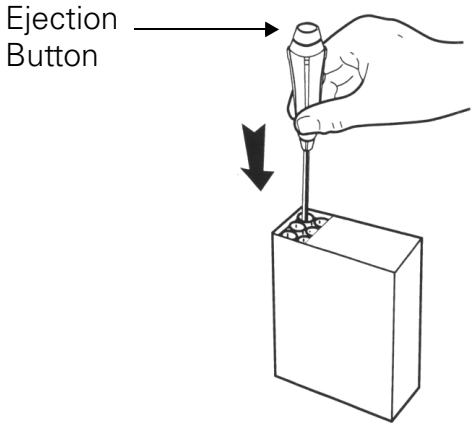
To place the Spot Vital Signs into Monitor Mode, remove the probe from the probe holder and take either oral, axillary, or rectal predictive temperature. When the predictive temperature is displayed, press the Mode button down once, making sure the position of the probe doesn't change. The thermometer switches from Normal mode to Monitor mode. An "M" appears on the temperature display to indicate that the thermometer is in Monitor Mode. When taking a Monitor mode temperature, maintain probe contact with the tissue for at least 3 minutes for oral/rectal temperatures, and 5 minutes for axillary temperatures. ***The Spot Vital Signs does not save the Monitor mode temperature***. Verify and record this temperature before placing the probe back in the probe holder.

If the thermometer is in Normal mode, you may easily switch to Monitor mode without taking a predictive temperature first. To do this, remove the probe from the probe holder, attach a new probe cover, and wait one minute (do not place probe in patient's mouth, underarm or rectum at this time). After one minute, the thermometer automatically switches to Monitor mode and an "M" is displayed. You may now proceed to take the patient's temperature. After the probe is replaced in the holder, the device reverts back to Normal temperature mode.

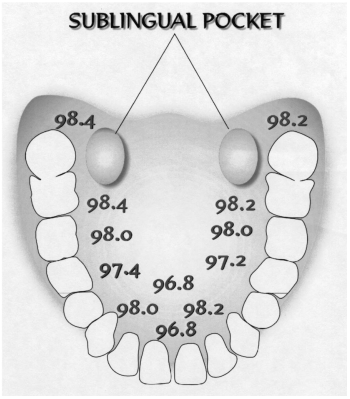
Taking an Oral Temperature

To take an oral temperature:

1. Insure that the oral probe is connected to the unit. The oral probe is BLUE. Accurate oral temperatures are obtained only by using the blue temperature probe.
2. Remove the probe from the probe holder. A short self-test mode is initiated where every LCD segment on the temperature display is illuminated briefly. Following this self-test, the display shows "OrL" indicating the oral probe is in use.
3. Once "OrL" is displayed, load a probe cover onto the probe by holding the probe collar with the thumb and forefinger, careful not to hold or press the ejection button.



4. Insert the probe tip gently into the patient's slightly opened mouth. Carefully slide the probe under the tongue on either side of the mouth to reach the posterial medial sublingual pocket (see illustration). Accurate temperatures are obtained only in this location. Temperatures in other mouth locations can vary by as much as 2°F or 1°C.



5. ***Hold the probe during the entire temperature measurement process to insure the probe tip maintains tissue contact.***
6. During the temperature measurement cycle, the temperature display shows a series of LCD segments in a box-shaped formation. This indicates that the temperature measurement is in process.
7. When the final temperature is reached, a beep sounds and the temperature is displayed.
8. After the temperature measurement is complete, remove the probe from the patient's mouth and eject the probe cover by firmly pressing the ejection button on the probe. Dispose of the used probe cover properly.
9. Insert the probe into the probe holder before attempting to take another temperature measurement.
10. In Normal mode, the current temperature is displayed for 2 minutes after the probe is placed back in the holder. The display then disappears (unless another measurement is active). You may recall the last patient reading by pressing the Mode button.

Note: If a probe position icon appears during the temperature determination, the temperature display alternates between the final predicted temperature and the letter "P."

Taking an Axillary Temperature

Note: Normal mode axillary temperatures are FDA approved only for children under the age of four. In Normal mode the device may not take accurate axillary temperatures for older children or adults. If an axillary reading is desired for a patient age four and older, use the oral probe in Monitor mode.

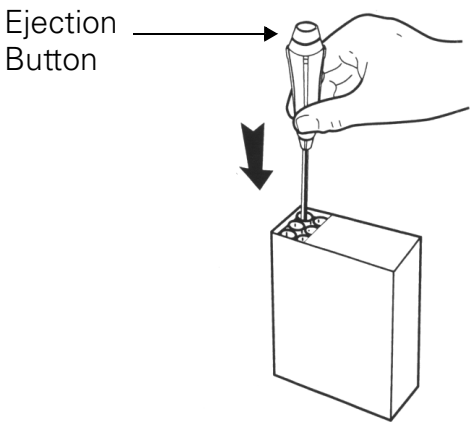
THE WELCH ALLYN SPOT VITAL SIGNS IS NOT INTENDED FOR USE ON NEONATAL PATIENTS.

To take an axillary temperature in either Normal or Monitor mode:

Normal Mode

1. Insure that the oral probe is connected to the unit. The oral probe is BLUE. Accurate oral temperatures are obtained only by using the blue temperature probe.
2. Remove the probe from the probe holder. A short self-test mode is initiated where every LCD segment on the temperature display is illuminated briefly. Following this self-test, the display shows "OrL" indicating the oral probe is in use.
3. Press the Mode button once and the LCD shows "ALY," indicating that the device is now ready to take an axillary temperature reading. Note that subsequent presses of the Mode button toggle between the oral and axillary modes of operation. The device's display must show "ALY" prior to the initiation of an axillary temperature measurement.

4. With the temperature display showing "ALY," load a probe cover onto the probe by holding the probe collar with the thumb and forefinger, careful not to hold or press the ejection button.



5. Lift the patient's arm so that the entire axilla is easily seen. Place the probe as high as possible in the axilla. Do not allow the probe tip to come into contact with the patient until it is deliberately placed in the measurement site. Any tissue contact before this time activates the probe position message, and may cause inaccurate temperature readings.
6. Verify that the probe tip is completely surrounded by axillary tissue. Clothing or other material touching the probe tip may cause inaccurate readings.
7. Place the arm snugly at the patient's side. Hold the arm in this position without movement of the arm or probe during the measurement cycle. Moving the arm may cause inaccurate readings. Hold the probe in place during the temperature measurement process to ensure the probe tip maintains tissue contact.
8. In Normal mode, the Spot Vital Signs beeps and displays the temperature reading when a final temperature is reached. This takes approximately 10 seconds. In Monitor mode, you should allow the temperature readout to stabilize for 5 minutes to accurately display a final temperature reading.
9. After the temperature measurement is complete, remove the probe from the patient's axilla and eject the probe cover by firmly pressing the ejection button on the probe. Dispose of the used probe cover properly.
10. Insert the probe into the probe holder before attempting to take another temperature measurement.
11. In Normal mode, the current temperature is displayed for 2 minutes after the probe is placed back in the holder. The display then disappears (unless another measurement is active). You may recall the last patient reading by pressing the Mode button.

Note: If a probe position icon appears during the temperature determination, the temperature display alternates between the final predicted temperature and the letter "P."

Monitor Mode

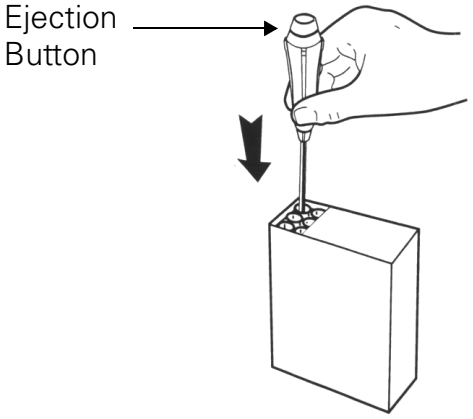
1. Remove the probe from the probe holder and take an axillary predictive temperature (the Thermometer mode must read "ALY").
2. When the thermometer is finished and a temperature is displayed, leave the probe in place and press the "Mode" button once. An "M" appears on the temperature display to indicate Monitor mode.
3. Maintain probe contact with the tissue for at least 5 minutes to obtain an accurate axillary Monitor mode temperature.
4. Record the Monitor mode temperature before placing the probe back in the probe holder. ***The Spot Vital Signs does not save the Monitor mode temperature.***

If the thermometer is in Normal mode, you can easily switch to Monitor mode without taking a predictive temperature first. To do this, remove the probe from the probe holder, attach a new probe cover, and wait one minute (do not place probe in patient's mouth, underarm, or rectum at this time). After one minute the thermometer automatically switches to Monitor mode. You may now proceed to take an axillary temperature. After the probe is replaced in the holder, the device reverts back to Normal temperature mode.

Taking a Rectal Temperature

To take a rectal temperature in either Normal or Monitor mode:

1. Insure that the rectal probe is connected to the Spot Vital Signs. The rectal probe has a RED tip. Accurate rectal temperatures are obtained only by using the red temperature probe.
2. Remove the probe from the probe holder. A short self-test mode is initiated where every LCD segment on the temperature display is illuminated briefly. Following this self-test, the display shows "Rec," indicating the rectal probe is in use. The display must show "Rec" prior to the initiation of a rectal temperature measurement.
3. Once "Rec" is displayed, load a probe cover onto the probe by holding the probe collar with the thumb and forefinger, careful not to hold or press the ejection button.



4. Separate the buttocks with one hand. Apply a thin coat of water-based lubricant when necessary. Using the other hand, gently insert the probe ONLY 1cm (5/8 inch for adults, and 1/2 inch for infants and children) inside the rectal sphincter. Use extreme caution to avoid risk of bowel perforation in children.
5. Tilt the probe to insure good tissue contact. Keep hands separating buttocks in place, hold the probe in place during the entire measurement process.
6. During the temperature measurement cycle, the temperature display shows a series of LCD segments in a box-shaped formation. This indicates that the temperature measurement is in process.
7. When the final temperature is reached, a beep sounds and the temperature is displayed. This takes approximately 15 seconds.
8. After the temperature measurement is complete, remove the probe from the patient's rectum and eject the probe cover by firmly pressing the ejection button on the probe. Dispose of the used probe cover properly.
9. Insert the probe into the probe holder before attempting to take another temperature measurement.
10. The current temperature is displayed for 2 minutes after the probe is placed back in the holder. The display then disappears (unless another measurement is active). You may recall the last patient reading by pressing the Mode button.

Note: If a probe position icon appears during the temperature determination, the temperature display alternates between the final predicted temperature and the letter "P."

Monitor Mode

1. Remove the probe from the probe holder and take a rectal predictive temperature (the temperature display must show "ALY").
2. When the thermometer is finished and a temperature is displayed, leave the probe in place and press the "Mode" button once. An "M" appears on the temperature display to indicate Monitor mode.
3. Maintain probe contact with the tissue for at least 3 minutes to obtain an accurate rectal Monitor mode temperature.
4. Record the Monitor mode temperature before placing the probe back in the probe holder. ***The Spot Vital Signs does not save the Monitor mode temperature.***

If the thermometer is in Normal mode, you can easily switch to Monitor mode without taking a predictive temperature first. To do this, remove the probe from the probe holder, attach a new probe cover, and wait one minute (do not place probe in patient's mouth, underarm, or rectum at this time). After one minute the thermometer automatically switches to Monitor mode. You may now proceed to take a rectal temperature. After the probe is replaced in the holder, the device reverts back to Normal temperature mode.

Measuring SpO_2

The Spot Vital Signs incorporates the Nellcor Puritan Bennett™ pulse oximetry system which determines arterial oxyhemoglobin saturation (SpO_2%) by measuring the absorption of red and infrared light passed through the tissues. Changes in absorption caused by pulsation of blood in the vascular bed are used to determine arterial saturation and pulse rate.

Oxygen saturation percent is calculated with each pulse detected, and the Spot Vital Signs display is continually updated. The pulse signal bar graph is an indicator of the strength and quality of the detected pulses.

SpO_2 is normally measured via pulses detected using a finger clip sensor. For certain situations, measurement and alternate site measurements for SpO_2 can include the earlobe, forehead, and toes. Use special sensors in these situations (see Appendix A).

Factors that may degrade the performance of the pulse oximeter:

- Excessive ambient light
- Excessive motion
- Electrosurgical interference
- Arterial catheters, blood pressure, and infusion lines, etc.
- Moisture in the sensor
- Improperly attached sensor
- Incorrect sensor for patient
- Poor patient perfusion
- Venous pulsations
- Anemia or low hemoglobin concentrations
- Cardiovascular dyes
- Sensor not at heart level
- Fingernail polish (if finger sensor is used)

Using the Finger Clip Sensor

Warning: Use only Nellcor Puritan Bennett™ brand SpO_2 sensors and accessories with Welch Allyn's Spot Vital Signs.

The finger clip pulse oximeter sensor is designed for spot check measurements of pediatric and adult patients.

Insert the patient's finger (preferably left or right index finger) completely into the sensor. The thumb is specifically not recommended for use with the finger clip sensor.

Note: If blood pressure measurement is occurring simultaneously, insure that the finger clip SpO_2 sensor is attached to the limb opposite the limb with the blood pressure cuff.

Note: Check sensor sites periodically to determine circulation, sensor positioning, and skin sensitivity.

Other Sensors

A wide variety of reusable and disposable pulse oximetry sensors are available for use with the Welch Allyn Spot Vital Signs. These sensors expand the utility of the pulse oximetry component of the device. For a detailed description of the use and application of these sensors, see "Appendix A - SpO2 Sensors" on page 55 of this manual.

Warning: Use only Nellcor Puritan Bennett™ brand SpO_2 sensors and accessories with Welch Allyn's Spot Vital Signs, configured with the Nellcor Puritan Bennett™ pulse oximetry module.

Taking an SpO_2 Measurement

To take an SpO_2 measurement:

1. Properly attach the appropriate sensor to the patient.
2. The pulse signal bar graph illuminates, indicating the relative strength and quality of the patient's pulses at the sensor site. The sensor takes approximately 10 seconds to determine the initial SpO_2% value and pulse rate. When the initial values are determined, they are shown in the SpO_2 display and the Pulse Rate display respectively.
3. The SpO_2% and pulse rate are updated approximately every second. The Spot Vital Signs monitors a patient's SpO_2 for up to 10 minutes. After 10 minutes, a C9 error code is displayed. this error code means that the 10 minute time has been exceeded.
4. If you remove the SpO_2 sensor from the patient, the measurement period ends and the pulse signal bar graph blanks. The SpO_2 display flashes for 8 seconds, then displays the last SpO_2 reading for 2 minutes (unless another measurement is active). The device then goes into standby mode. You may recall the last patient reading by pressing the Mode button.

Note: If the SpO_2 sensor is detached or falls off a patient, the SpO_2 reading flashes for 8 seconds. If the sensor is not reattached to the patient in 8 seconds a beep sounds, notifying you that the SpO_2 measurement has ended.

Mean Arterial Pressure (MAP) Mode

You may turn on or off the Mean Arterial Pressure (MAP) mode by entering the internal configuration mode:

1. Turn the Spot Vital Signs off.
2. Press both the Power and Blood Pressure Start/Stop buttons simultaneously. The device enters its internal configuration mode.
3. Press the Mode button to cycle through the menu until you reach the MAP option screen.
4. Pressing the BP Start/Stop or the Next Patient/Clear button turns the MAP on or off. When the desired functionality is displayed, press the Mode button once to save this change.
5. Turn the device off.

When the device is turned on, the desired MAP functionality is established.

Troubleshooting, Maintenance, and Calibration

Troubleshooting: Error Indications and Interpretation

The following table of conditions and error codes provides a quick reference of the descriptions and probable causes of error codes. For service-level troubleshooting, refer to the service manual.

Press the white Blood Pressure Start/Stop button to reset flashing patient alarm conditions.

General Error Codes		
Code	**Description**	**Corrective Action**
E11	Internal safety violation	Check patient, contact Customer Service.
C12	Ambient temperature out of range	Adjust temperature or device location.
C13	Battery failure	Use wall transformer.
E0.0 - E9.9	Temperature module malfunction	Contact Customer Service.
E20 - E50	General internal malfunction	Contact Customer Service.

Blood Pressure Error Codes		
Code	**Description**	**Corrective Action**
C02	Auto-zero failure	Check for air obstruction, limit patient movement.
C03	Inflation too rapid	Check for kinked hose or air obstruction.
C04	Excessive inflation time	Check for air leaks.
C05	Excessive noise	Check patient condition, cuff placement, limit patient movement.
C06	Measurement was outside of device's measurement range	Check patient condition.
E10	Cuff overpressure condition	Check patient condition.

Temperature Error Codes		
Code	**Description**	**Corrective Action**
C20	Broken/missing probe	Replace probe.
P	Loss of tissue contact	Insure proper probe positioning.

Temperature Error Codes		
Code	**Description**	**Corrective Action**
E0.2, E0.3	Ambient temperature out of range	Adjust temperature or device location.
C22	10 minute diagnostic limit exceeded	Check patient. Read Operator's Manual. Verify that the device is not used for monitoring purposes.

SpO_2 Error Codes		
Code	**Description**	**Corrective Action**
E7	Internal malfunction	Contact Customer Service.
C9	10 minute diagnostic limit exceeded	Check patient. Press Next Patient/Clear button to clear error code. Verify that the device is not used for monitoring purposes.

Troubleshooting: General Guide to Problems and Corrective Actions

Quick Guide to Taking Manual (Auscultatory) Blood Pressure

Action	Explanation
Use a certified accurate sphygmomanometer and quality stethoscope.	Many sphygmomanometers are inaccurate. Low quality stethoscopes do not transmit sound well enough to accurately hear blood pressure sounds.
Select a blood pressure cuff of a suitable size. Use a blood pressure cuff of the largest appropriate size for patient (see markings on inside of cuff).	A cuff that is either too large or too small may cause inaccurate readings.
Have the patient assume a comfortable position with the upper arm relaxed at heart level and the lower arm passively supported.	Inaccurate readings result if the arm is not at the proper level.
Expose the area of the brachial artery by removing clothing, or move a sleeve, if not too tight, above the area where the cuff is placed.	Clothing over the artery hinders the ability to hear and may cause inaccurate readings. Tight clothing may cause vessel congestion and inaccurate readings
Center the cuff bladder so the lower edge is at least 1 inch (2.5cm) above the bend of inner arm of the elbow.	This places the cuff in the best position for occluding the blood flow through the brachial artery.
Palpate the brachial or radial pulse.	Determines the most accurate location for assessment and approximation of systolic pressure.
Inflate the cuff until the pulsation disappears. Continue to inflate until the pressure reads 30 mmHg above the point where the pulse disappeared.	Facilitates identification of Phase One Korotkoff sounds.
Listen carefully with stethoscope over brachial artery while controlling the release of air at a rate of 3 mmHg per second.	One of the major sources of error in auscultatory blood pressure measurement is deflating the cuff too quickly. It is a normal operation of the Welch Allyn Spot Vital Signs to deflate at the American Heart Association recommended 3 mmHg per second.
Systolic is determined by reading the manometer gauge when the first faint but clear tapping sound is heard with the stethoscope.	Follows AHA recommended standards.
Diastolic, in adults, is determined by reading the manometer gauge to the closest even number when the last sound is heard. Release the air quickly after at least 10 to 20 mmHg of silence.	Diastolic blood pressure in children is the point at which the sound becomes muffled.

SYMPTOM: Inaccurate Blood Pressure Readings

Note: Differences of up to 10mmHg are considered normal and occur for a number of reasons including intra-patient BP variability, observer hearing differences, and auscultatory deflation rate.

Possible Cause	Explanation and Corrective Action
Incorrect cuff size. Use Welch Allyn approved cuffs only.	Determine correct cuff size. • Use reference markings on cuff. • Measure patient's arm circumference midway between elbow and shoulder (see "Chart for Determining Cuff Size" on page 29 to select correct cuff size).
Patient's arm position	Ensure patient's arm is at heart level.
Arm movement during blood pressure cycle	Keep arm still during blood pressure cycle. • Movement may cause inaccuracies from artifact.
Blood pressure taken over clothing	Take blood pressure on a bare arm.
Arrhythmia	Check for regularity of heart rate (palpate pulse or check device). • Moderate to severe heart rate irregularities may make blood pressure difficult to measure.
Incorrect reference	Use the correct Korotkoff sound to determine diastolic blood pressure. • Many listeners incorrectly equate diastolic blood pressure with the disappearance of sound only (phase 5). The Welch Allyn Spot Vital Signs was developed using the American Heart Association recommendations, which state that phase 5 be used unless sound continues to 0 mmHg, in which case the change in the quality of sound (phase 4) is to be used. Deflate cuff no faster than 3 mmHg per second. • One of the major sources of error in auscultatory blood pressure measurement is deflating the cuff too quickly. The American Heart Association recommends deflation no faster than 3 mmHg per second. Only use a sphygmomanometer that is calibrated. • An uncalibrated sphygmomanometer may take inaccurate blood pressure measurements.
Change in blood pressure between auscultatory reading and Welch Allyn Spot Vital Signs reading	Check blood pressure immediately prior to Welch Allyn Spot Vital Signs reading.
Poor auscultatory sound recognition by observer	Use higher quality stethoscope. Have a different observer check patient's blood pressure.

SYMPTOM: Cuff Inflation and Deflation with No Blood Pressure Reading Displayed (or Error Code in Display)

Possible Cause	Explanation and Corrective Action
Leak in pneumatic system	Ensure all cuff attachments are tight. Carefully check for tubing leaks in blood pressure cuff and tubing attached to the device.
Arm movement during cycle	Keep arm still during blood pressure cycle. Movement may cause inaccuracies from artifact.
Tubing movement artifact	Do not contact tubing during blood pressure cycle. Movement may cause inaccuracies from artifact.

SYMPTOM: No Cuff Inflation

Possible Cause	Explanation and Corrective Action
Connections between device and cuff loose	Check all connections (do not over tighten).

SYMPTOM: Temperature Malfunction

Possible Cause	Explanation	Corrective Action
Error code displayed	Broken probe	Replace probe. Consult Technical Manual. Notify biomedical department or Welch Allyn Technical Support.
Low temperature readings	Improper probe placement	Place probe in most posterior sublingual pocket when in Orl mode.
No temperature displayed	Probe not replaced	Replace probe in holder prior to taking another temperature.

SYMPTOM: SpO_2 Malfunction

Possible Cause	Explanation	Corrective Action
Sensor in place but no $Sp0_2$ on display	Improperly attached sensor	Insert the patient's finger completely into sensor. Verify BP and SpO_2 measurements are not taken on the same extremity.
	Cable incorrectly plugged into device	Ensure sensor cable is correctly plugged into device.
Inaccurate $Sp0_2$ Reading.	Incorrect sensor	Ensure that correct manufacturer's sensor is in use. Use only Nellcor Puritan Bennett™ sensors.

SYMPTOM: Printer Malfunction

Possible Cause	Explanation and Corrective Action
Paper does not advance	Consult printer Technical Manual. Notify biomedical department or Welch Allyn Technical Support.
Printer prints light characters, boxes, or nothing at all.	Check the AA batteries in the printer and replace, if necessary.

SYMPTOM: Device Does Not Turn On

Possible Cause	Explanation and Corrective Action
Low battery	Check connections between device and transformer, and transformer and wall receptacle.
Device not powering up	Unplug unit from wall receptacle and check for breaks in cord. If connections are secure, check electrical outlet. Charging indicator is on if connections are good and the device is plugged into a working outlet. Notify biomedical department or Welch Allyn Technical Support.

SYMPTOM: Cuff Too Tight (Over Inflation)

Possible Cause	Explanation and Corrective Action
Pressure Preset too high	Check default Pressure Preset setting in internal configuration mode. Unless patient has underlying systolic hypertension, set Pressure Preset at 160 mmHg. (If systolic blood pressure greater than Pressure Preset, the device automatically increases an additional 40 mmHg.)

SYMPTOM: Cuff Pops Off

Possible Cause	Explanation and Corrective Action
Inappropriate cuff size	Determine cuff size with the cuff markings or see "Chart for Determining Cuff Size" on page 29. If cuff continues to pop off, notify biomedical department or Welch Allyn Technical Support.
Cuff applied inside out	Re- apply cuff. Make sure Welch Allyn label is facing away from arm.

SYMPTOM: Cuff Deflating Too Slowly

Possible Cause	Explanation and Corrective Action
Normal operation	Typical time to take a reading is 20 to 45 seconds. 165 seconds is the maximum.
Pressure Preset too high	Check default Pressure Preset setting in internal configuration mode.
Patient movement	Have patient sit still. Do not have arm tight against chest wall, as respiration may affect speed and accuracy of blood pressure measurement.
Small leak in pneumatic system	Check cuff and tubing for leaks.

Maintenance

Welch Allyn will make available,upon request, circuit diagrams and other information which will assist appropriately qualified technical personnel in repair of this device. Please reference "4200-145E Service Manual" on page 50.

Cleaning

Spot Vital Signs

Wipe the Spot Vital Signs clean with a cloth slightly dampened with warm water and a mild detergent solution. Never immerse the Spot Vital Signs in any type of fluid.

Occasionally clean the unit, as necessary, with appropriately diluted, non-staining disinfectant solution. Use either 70% isopropyl alcohol, 10% chlorine bleach solution, or mild detergent in water.

Note: Prevent water or other fluids from entering any connectors. Should this occur, dry the connectors with warm air. Check all measurement functions for proper operation.

Every 3 months, inspect the temperature probe, SpO_2 Cord, and accessories for fraying or other damage. Replace as necessary.

Do not sterilize or autoclave the Spot Vital Signs.

Blood Pressure Cuff

Clean the durable one-piece blood pressure cuff with a damp cloth, or wash in water with soap or detergent. Before washing the cuff, remove the tube fitting(s), close off tubes with plugs (available as accessory 5082-163), and place the hook and loop fasteners in the closed position. After washing, allow the cuff to air dry. Re-assemble the tube fitting(s).

Disinfection: You may use glutaraldehyde-type liquid disinfectants on the durable cuff. Prolonged use of these disinfectants at full strength may cause discoloration of the white cuff markings.

Sterilization: Do not use steam or heat to sterilize the cuff or tubing. If necessary, use gas sterilization.

Do not press with a hot iron.

Cables and Pressure Hose

Wipe the cabling and pressure hose with a damp cloth moistened in a mild detergent solution. Do not immerse hose.

Temperature Probe

Periodically clean the temperature probe by wiping with an alcohol-dampened cloth, or wipe with warm water or properly diluted, non-staining disinfectant. Do not immerse the probe.

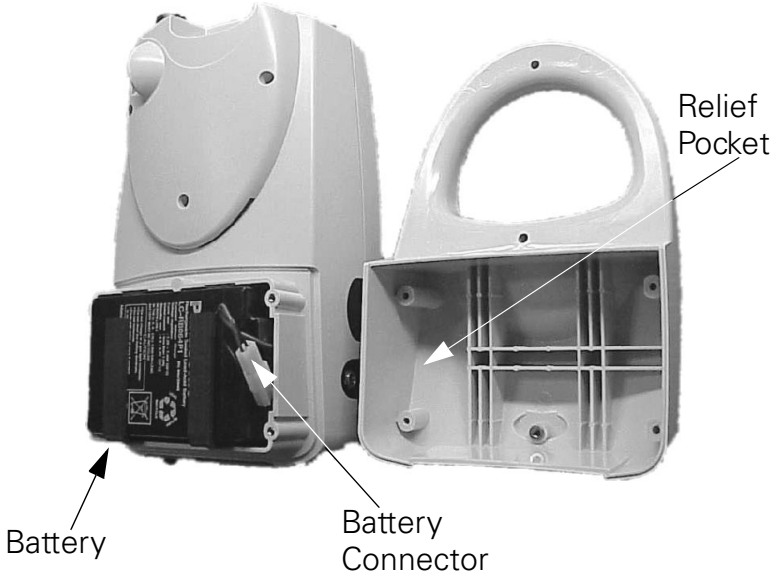
SpO_2 Sensor

Clean the reusable SpO_2 sensor with isopropyl alcohol solution, and sterilize it using ethylene oxide (EtO), cold cycle. Do not immerse the sensor.

Battery Removal and Replacement

If necessary, replace the internal battery after heavy use. When the battery no longer charges, remove it and replace it with a battery with the same part number. To replace the battery:

1. Insure the AC power transformer cord is disconnected from the Spot Vital Signs and that the device is turned off.
2. Use a phillips-head screwdriver to remove the 4 screws holding the battery door. Remove the battery door and expose the battery.
3. Tip the Spot Vital Signs and slide the battery out. Disconnect the in-line connector and discard the old battery per local regulations. Re-connect new battery to unit connector as quickly as possibly to prevent loss of power to the unit and subsequent loss of clock time.
4. Attach the battery connector to the new battery as shown:
5. Slide the new battery into the battery compartment as far as it will go. Do not push the connector down into the case or lay it flat next to the battery. The relief pocket in the battery door purposely provides sufficient clearance for the battery connector.
6. Replace the battery door, tightening each of the 4 screws.
7. Connect the AC power transformer to the Spot Vital Signs and allow the new battery to charge for approximately 16 hours. It is possible to use the Spot Vital Signs during this charging period.
8. If an E38 error code is displayed when the device is owered on, refer to section "Changing the Time/Date Set" on page 26.



The battery is a non-spillable lead-acid battery. In the USA, call 1-800-SAV-LEAD for instructions on how to recycle. For International users, contact your local authorities on recycling.

Supplies And Accessories

Latex-Free Blood Pressure Accessories and Supplies

Cuff and Bag Combination

5200-01 Adult (cuff, bladder, and connector)
5200-02 Large Adult (cuff, bladder, and connector)
5200-03 Child Print (cuff, bladder, and connector)
5200-10 Thigh (cuff, bladder, and connector)

Durable One-Piece Cuff

5200-13 Small Child (one-piece cuff and connector)
5200-14 Child (one piece cuff and connector)
5200-15 Small Adult (one piece cuff and connector)
5200-16 Adult (one piece cuff and connector
5200-17 Large Adult (one piece cuff and connector)
5200-18 Extra Large Adult (one piece cuff and connector)

Disposable Monitor Style One-Piece Blood Pressure Cuff

5082-93-3 Small Child Cuff
5082-94-3 Child Cuff (white)
5082-94P-3 Child Cuff (print)
5082-95-3 Small Adult Cuff
5082-96-3 Adult Cuff
5082-97-3 Large Adult Cuff
5082-98-3 Thigh Cuff

Miscellaneous

5082-59 Cuff: Adult
5082-61 Cuff: Large Adult
5082-63 Cuff: Child Print
5082-64 Cuff: Thigh
5200-04 Bladder: Adult (includes connector)
5200-05 Bladder: Large Adult (includes connector)
5200-06 Bladder: Child (includes connector)
5200-11 Bladder: Extra Large Adult (includes connector)
5200-07 Coiled Pressure Hose (8ft.) (2.4M)
(Note: For additional length, connect one additional hose to provide extended length. All appropriate connectors are included.)
5200-12 Straight Pressure Hose (8ft.) (2.4M)
5200-08 Calibration T-Connector

Temperature Accessories and Supplies

02678-100	Oral Probe: (9ft.) (2.7M)
02679-100	Rectal Probe: (9ft.) (2.7M)
05031-101	Disposable Probe Covers (1000 covers, packaged 25/box)
06137-000	Temperature Calibration key

Nellcor Puritan Bennett™ Pulse Oximetry Accessories and Supplies

DS-100A	DURASENSOR® Adult Oxygen Transducer
EC-8	Extension Cable (8ft.)
D-YS	DURA-Y® Oxygen Transducer (1 sensor, 40 wraps)
D-YSE	Ear Clip, (use with Dura-Y sensor)
D-YSPD	PediCheck™ Pediatric Spot Check (use with Dura-Y sensor)
D-25	OXISENSOR® II Adult Digit Oxygen Transducer (case of 24)
D-25L	OXISENSOR® II Adult Digit Oxygen Transducer, long cable (case of 24)
D-20	OXISENSOR® II Pediatric Oxygen Transducer (case of 24)
I-20	OXISENSOR® II Infant Digit Oxygen Transducer (case of 24)
R-15	OXISENSOR® II Adult Nasal Oxygen Transducer (case of 24)
OXICLIQ® A	Adult Oxygen Transducer, use with OC-3 cable (case of 24)
OXICLIQ® P	Pediatric Oxygen Transducer, use with OC-3 cable (case of 24)
OC-3	OXICLIQ® Sensor Cable
OXI-A/N	OXIBAND® Adult/ Neonatal Oxygen Transducer (1 sensor, 50 wraps)
OXI-P/I	OXIBAND® Pediatric/ Infant Oxygen Transducer (1 sensor, 50 wraps)
RS-10	Reflectance Oxygen Transducer (6 sensors, 6 headbands)

Mounting Accessories and Supplies

4200-60	Complete Mobile Stand Unit <u>includes:</u> Storage Basket Pole and Base Assembly Transformer Mounting Kit Recommended for models: 4200B, 42NOB, 420TB, 42NTB.
4200-62	Complete Wall Mount Unit <u>includes:</u> Storage Basket Wall Mount Bracket Transformer Mounting Kit Recommended for Models: 4200B, 42NOB, 420TB, 42NTB.
4200-70	Anti-Theft Kit for Spot Vital Signs
4200-80	Mobile Stand Mount for Printer

Miscellaneous Supplies

14042	Thermal Printer
14052	Thermal Printer with Mobile Stand Mount
53600	Printer Paper (1 case, 6 boxes, 24 rolls)
53600B	Printer Paper (4 roll box)
4200-84	Lead Acid Battery
4200-85E	Operator Manual
421054-1E	Quick Reference Card
4200-145E	Service Manual
4200-150E	Training Video
4200-100	Welch Allyn Spot Vital Signs Carrying Case
5200-101A	AC Power Transformer (desktop transformer, line cord not included) -120V, 60Hz
5200-102A	AC Power Transformer (desktop transformer, line cord not included) -230V, 50Hz
5200-103A	AC Power Transformer (desktop transformer, line cord not included) -240V, 50Hz
5200-110	Line Cord (United States/Canadian/Japanese version)
5200-111	Line Cord (European version)
5200-112	Line Cord (United Kingdom version)
5200-113	Line Cord (Australian version)

Warranty and Service

Warranty

Welch Allyn warrants the Spot Vital Signs, when new, to be free of defects in material and workmanship and to perform in accordance with manufacturer's specifications for a period of two years from the date of purchase from Welch Allyn or its authorized distributors or agents. Welch Allyn will either repair or replace any components found to be defective or at variance from manufacturer's specifications within this time at no cost to the customer. It shall be the purchaser's responsibility to return the Spot Vital Signs to Welch Allyn or an authorized distributor, agent or service representative. This warranty does not include breakage or failure due to tampering, misuse, neglect, accidents, modification or shipping. This warranty is also void if the instrument is not used in accordance with manufacturer's recommendations or if repaired by other than Welch Allyn or an authorized agent. Purchase date determines warranty requirements. No other express warranty is given.

IMPORTANT - Return the Instrument Registration Card

Remember to submit the instrument registration/warranty card for warranty validation. Complete the information and mail the pre-addressed card to Welch Allyn.

Service Policy

All repairs on products under warranty must be performed or approved by a Welch Allyn Service Center. *Unauthorized repairs will void the warranty*. Products out of warranty should be repaired by qualified electronics personnel or a Welch Allyn Service Center.

Technical Assistance

If you have an equipment problem that you cannot resolve, you may call the Welch Allyn Service Center nearest you for assistance. Technical service support is available by telephone on normal business days at the phone numbers listed on page 52.

If you are advised to return a product to Welch Allyn for repair or routine maintenance, schedule the repair with the service center nearest you.

Before returning a product for repair you must obtain authorization from Welch Allyn. An RMA (Return Merchandise Authorization) number will be given to you by our service personnel. Be sure to note this number on the outside of your shipping box. Returns without an RMA number will not be accepted for delivery.

Welch Allyn Service Centers

For Service or Repair

USA Customers

Welch Allyn/Tycos Inc.
Technical Service Centers
95 Old Shoals Road
Arden, NC 28704-9739
Phone: (800) 535-6663
Fax: (704) 687-1002

CANADA Customers

Welch Allyn Canada Limited
Technical Service Centers
160 Matheson Blvd., East
Mississauga, Ontario L4Z 1V4
Phone: (905) 890-0004 or 1 800-561-8797
Fax: (905) 890-0008

INTERNATIONAL Customers

Speidel + Keller GmbH Co. + KG

Technical Service Centers
Zollerstrasse 2-4
D-72417 Jungingen
Germany
Phone: 011497477927173
Fax: 011497477927193

Welch Allyn Australia Pty. Ltd.

Technical Service Centers
38-46 South Street
Rydalmere NSW 2116
Phone: 01161296383000
Fax: 01161296383500

Welch Allyn Ltd. Singapore

#21-09 Golden Mile Tower
6001, Beach Road
Singapore 199589
Republic of Singapore
Phone: 011652910882
Fax: 011652915780

Welch Allyn UK Ltd.

Cublington Road
Aston Abbotts
Buckinghamshire HP224ND
Phone: 011441296682140
Fax: 011441296682104

LATIN AMERICA Customers

MDI International
Technical Service Centers
7324 S.W. 48th Street
Miami, FL 33155
USA
Phone: (305) 669-9003
Fax: (305) 669-8951

CE

The CE Mark on this product indicates it has been tested to and conforms with the provisions noted with the 93/42/EEC Medical Device Directive.

European contact for regulatory compliance:

European Regulatory Manager
Welch Allyn LTD.
Navan, Co. Meath
Republic of Ireland
Phone: 353-46-79060
FAX: 353-46-27127

Service Manual/Spare Parts

A service manual is available by request to qualified electronics personnel. The service manual is a comprehensive guide to troubleshooting, service, and repair of the Spot Vital Signs.

Also included with the service manual is a complete spare parts list. Order spare parts from your local Welch Allyn Service Center.

Service Loaners

Service loaners are provided, on request, when repair service is provided by a Welch Allyn Service Center. Loaners for products repaired while under the original warranty, or while under extended warranty or service contract, are provided free of charge and are shipped within 48 hours of notification of need. Shipment charges are paid by Welch Allyn.

For service repairs outside of warranty or contract, loaners are available for a nominal daily charge and shipment is subject to availability. Loaners are shipped pre-paid, however this charge is added to the service charges.

Appendix A - SpO_2 Sensors

The Spot Vital Signs features sensors that are ideal for nearly every application. These sensors include the infant sensor, the flex sensor, the finger clip sensor, the ear clip sensor, the reflectance sensor, and 3 different flexi-form, single-patient use sensors. Each sensor is designed for a specific site application, and specific patient size and weight range. When selecting sensors for a particular application consider the following:

- The best performing sensor for most patients is an appropriately sized adhesive style sensor, either reusable or single-patient use, located on the finger or toe.
- The finger clip sensor is recommended for spot checks or short term continuous measurement. The finger clip sensor performs best for most patients when used on fingers other than the thumb. The finger clip sensor is not recommended where motion is expected, or for relatively long term measurement, i.e., greater than 10 minutes.
- Infant sensors are recommended for use on the big toe of infants larger than 2 kilograms in weight. Use Hydrogel style double stick tape and an overwrap around the sensor when using the reusable style sensor. The flexi-form sensor does not require the use of additional tape strips or the overwrap.
- The reflectance and ear clip sensors generally do not perform as well as sensors located on the finger or toe. They are not recommended for applications where the best possible SpO_2 accuracy is important. Use the reflectance and ear clip sensors when fingers and toes are not suitable, as with peripheral shut down, or when measuring central body perfusion for timing response reasons. They are also useful in high motion environments such as stress testing.

Clear Tape Strips or Hydrogel Tape Strips are recommended to provide additional securing for the reusable infant and flex sensors.

Clean reusable sensors with an isopropyl alcohol wipe. Allow enough time for the sensor to dry thoroughly before reusing. The reusable sensors are also sterilized using ethylene oxide (EtO), (cold cycle).

Compatibility

Caution: Use only the sensors provided by Welch Allyn. These sensors are manufactured to meet the calibration requirements for the Spot Vital Signs.

Caution: Each sensor is designed for a specific clinical application. Optimal performance is attained only by using each sensor appropriately.

Factors that may degrade the performance of the pulse oximeter:

- Excessive ambient light
- Excessive motion
- Electrosurgical interference
- Arterial catheters, blood pressure, and infusion lines, etc.
- Moisture in the sensor
- Improperly attached sensor
- Incorrect sensor for patient
- Poor patient perfusion
- Venous pulsations
- Anemia or low hemoglobin concentrations
- Cardiovascular dyes
- Sensor not at heart level
- Fingernail polish (if finger sensor is used)

Caution: Discontinue use of double-backed adhesive strips or the Hydrogel tape strips if the patient exhibits allergic reactions to the adhesive material.

Caution: Check sensor sites periodically to determine circulation, sensor positioning, and skin sensitivity.

Applying the Appropriate Oximeter Sensor

Finger Clip Sensor - The finger clip sensor is for spot check measurement of pediatric and adult patients, or continuous measurement less than 10 minutes where patient movement is not expected and the patient's finger is large enough for the sensor to be attached securely.

Note: If patient movement is occurring or the finger size is inappropriate, select a different sensor that is appropriate for the patient.

Insert finger (preferably left or right index finger) completely into the sensor. The thumb is specifically not recommended for use with the finger clip sensor.

Note: For best results, secure the sensor cable independently from the sensor, preferably around the base of the finger. Make sure the tape securing the cable does not restrict blood flow.

Flex Sensor - The flex sensor is for measurement of pediatric and adult patients in which moderate patient movement is expected. Apply the double stick tape to the smooth side of the sensor.

Position the sensor on the top and bottom of the end of the finger or toe. Place the light emitter portion on the finger/toe nail side, and the detector on the side opposite of the nail. In all sensor placement applications, align the windows (detector and emitter portions of the sensor) over the tissue. Attach the sensor using 3M Micropore™* tape or equivalent, and wrap the tape or sen-

sor wrap over the sensor assembly. Wrap the sensor snugly, but not so tight that it restricts the blood flow.

Note: For optimum light transmission, attach the sensor to the finger or toe. For best results, secure the cable independently from the sensor. Make sure that the tape securing the cable does not restrict the blood flow.

*Micropore is a registered trademark of the 3M Company.

Infant Sensor - The infant sensor is for measuring infants where finger tip measurement is impractical. The infant sensor should be applied to the large toe of infants greater than 2 kilograms. Apply the clear, double stick tape or Hydrogel Tape Strips to the smooth side of the sensor.

Position infant sensor on the big toe. Make sure the emitter portion of the sensor is exactly aligned with the detector portion. Verify that the light emitter portion of the sensor is on the nail or top side of the foot, and the detector is on the opposite side.

Note: Attach the sensor using 3M Micropore™* tape or equivalent by wrapping the tape or sensor wrap over the sensor assembly snugly, but not so tight that it restricts blood flow. For best results, secure cable independently from the sensor, preferably around patient's ankle or lower leg. Make sure the tape securing the cable does not restrict blood flow.

*Micropore is a registered trademark of the 3M Company.

Ear Clip Sensor - This sensor is for adults where finger tip measurement is impractical. Rub the ear lobe vigorously for 5 seconds and then apply the ear clip to the lobe of the ear. Make sure the ear clip is positioned so the LED emitters and the detector are completely covered by the earlobe. This ensures no stray light bypasses the earlobe, which can lead to SpO_2 inaccuracies.

Reflectance Sensor - The reflectance sensor is for use on well vascularized skin surfaces. For adults, this is usually the center of the forehead slightly above and between the eyebrows. The reflectance sensor holder provides the precise skin pressure this sensor requires.

Remove the backing from one side of the double back tape and apply to the flange of the holder, then remove the back from the other side of the tape. Press the sensor into the foam with the windows out, and apply to the patient. Use additional tape to secure the lead wire to the patient to avoid pulling or tipping the sensor.

Caution: The reflectance sensor is not recommended for pediatric patients because the accuracy is not established for pediatric use.

Adult and Pediatric Finger Flexi-Form Sensor - This single-patient use sensor is for measuring adult and pediatric patients where moderate patient movement is expected, or cross contamination is possible.

The preferred application site is the index finger. However, you may use other fingers or toes where the tissue thickness is between 5 and 21 millimeters. Other sites may not give acceptable results because of inadequate perfusion or inadequate light transmission. The application of these sensors is the same for either adult or pediatric patients; the difference is in the size of the sensor. For best results, secure the cable independently from the sensor. Make sure the tape securing the cable does not restrict blood flow.

Caution: Do not stretch the tape while applying the sensor. This may cause inaccurate readings or skin blisters.

Note: These sensors may be sterilized using ethylene oxide (EtO), cold cycle after removal from the plastic shipping bag.

1. Grip the tab on the sensor's bottom adhesive cover and peel the adhesive cover off.
2. Place the patient's finger or toe into the sensor, nail side up, with the tip of the finger or toe centered against the center line mark in the curved area. Reference the line that indicates the center of the curved area on the tape. This will assure vertical alignment between the emitter and detector. Wrap the tape around the finger. Do not cover the fingernail with tape during this step.
3. Grip the top adhesive cover and peel it off.
4. Fold the sensor's top over the top of the finger. Ensure that the detector and emitter are vertically aligned by the dotted axis line.

Infant Flexi-Form Sensor - The preferred application site is the large toe of infants greater than 2 kilograms in weight. Other sites may not give acceptable results because of inadequate perfusion or inadequate light transmission.

Note: For best results, secure cable independently from the sensor, preferably around patient's ankle or lower leg. Make sure the tape securing the cable does not restrict blood flow.

Caution: Check sensor sites periodically to determine circulation, sensor positioning, and skin sensitivity.

Caution: Do not stretch the tape while applying the sensor. This may cause inaccurate readings or skin blisters.

Note: These sensors may be sterilized using ethylene oxide (EtO), cold cycle after removal from the plastic shipping bag.

1. Grip the sensor's adhesive cover and peel the adhesive cover off.
2. Place the sensor on the large toe with the center line mark centered on the side of the large toe, taking care to have the detector centered on the bottom of the toe, and the emitter centered on the toenail.
3. Wrap the tape around the toe, taking care to ensure that the detector and emitter are vertically aligned by the dotted axis line.

Welch Allyn®

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